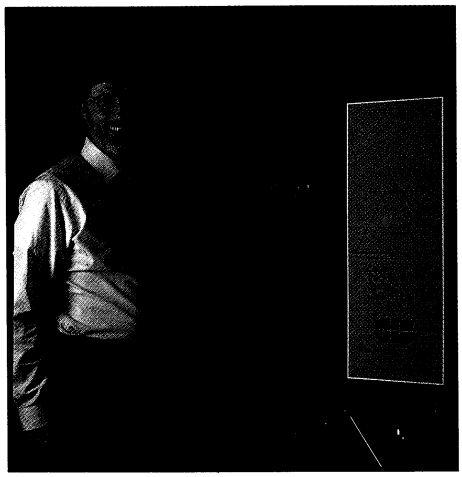
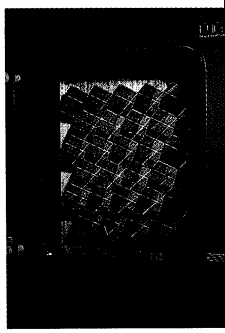
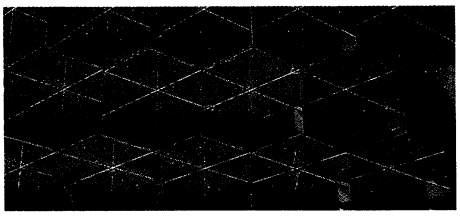
Optical Instruments







Among the experiments of the 1975 joint U.S./USSR Apollo-Soyuz orbital mission was one involving measurement of gases in the atmosphere by an advanced optical system. A key element of the equipment used was a device called a retroreflector, a mirror-like instrument that reflects light and other radiation back to its source. With the spacecraft at a fixed distance apart, Apollo sent a beam of ultraviolet radiation to a retroreflector array on Soyuz, and the beam was reflected back to an instrument on Apollo that measured the amount of radiation absorbed; that offered clues to the densities and concentrations of atmospheric gases at low Earth orbital altitudes.

The hollow retroreflector used on Apollo-Soyuz was developed for NASA by Precision Lapping & Optical Company, Inc., Valley Stream, New York, manufacturer of high technology precision optical equipment. That experience made Precision Lapping a pioneer company in retroreflector development. In the years since, Precision Lapping has developed a wide variety of hollow retroreflector systems for applications involving the entire optical spectrum; they are, according to company literature, cheaper, more accurate, lighter and capable of greater size than solid prisms.

Precision Lapping's major customers are aerospace and defense companies, government organizations, R&D and commercial instrument companies. For example, Precision Lapping supplies hollow retroreflectors for the laser fire control system of the Army's Abrams tank, and retroreflectors have been and are being used in a number of space tests relative to the Air Force's Strategic Defense Initiative (SDI) research program.

An example of a customer/user of Precision Lapping's products is Chesapeake Laser Systems, Lanham, Maryland, producer of the Laser Tracker System CMS-2000, which has applications in SDI research and in industrial robotics (for tracking the movement of robot arms). The CMS-2000 employs a retroreflector to lock onto a laser beam and track the source of the beam. At top left above, Chesapeake Laser president Brad Merry shows the system's utility; holding a retroreflector, he makes a circular motion with his hand and creates a laser pattern that demonstrates the Laser Tracker's ability to follow any movement.

Another Precision Lapping customer is MDA Scientific, Inc., Norcross, Georgia, manufacturer of a line of toxic gas detection systems used to monitor the hazardous gases present in oil fields, refineries, offshore platforms, chemical plants, waste storage sites and other locations where gases are released into the environment. The product line is based on the fact that each gas has a unique absorption spectrum; by carefully choosing light sources that can be tuned and filtered to produce specific wavelengths, the systems can selectively identify and monitor specific gases without interference from atmospheric conditions or other background gases. Retroreflectors are employed to reflect the light back to its source; measurement of the changes in light between source and receptor determines the presence of a specific gas and its concentration. At top right is a 30-retroreflector array employed by MDA Scientific in an infrared light source detection system; the retroreflectors are shown in closeup in the lower photo.